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State of Utah

DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER
Executive Director

Division of Water Rights

KENT L. JONES
State Engineer/Division Director

October 5, 2015

Welch Field Ditch Company
Attn: Susan Ralston, President
PO BOX 668
Morgan, UT 84050

Re: Water Measurement at Welch Field Ditch Company Flume

Dear Ms. Ralston,

The Utah Division of Water Rights, with participating water users and other water agencies, are working together to automate several important flow measurements on the Weber River and Ogden River systems. All major East Canyon Creek diversions, including the Welch Field Ditch Company, are included in this automation project. The purpose of this letter is to outline Welch Field Ditch Company's responsibilities associated with the project. It is my understanding that Dee Waldron indicated he uses the water and is willing to help the Welch Field Ditch Company with the required work.

We inspected the Welch Field Ditch measuring device on August 5, 2015. Based on our inspection, Welch Field Ditch Company is required to complete the following:

- A stilling well is required at the company flume to enable a recording of the water level or gauge height. The attached instructions "Stilling Wells on Measuring Devices" should answer most questions relating to Stilling Well construction.

Please have this work completed **before April 15, 2016**. If you have any questions, please call our Automation Engineer, Aaron Hunt, at 435-752-8755, or call me at 801-538-7469.

Sincerely,

Ben L. Anderson, P.E.
Field Services/Distribution Engineer

cc: Cole Panter, Weber River Water Commissioner
Erma Carter, Deputy Water Commissioner
Ross Hansen, Regional Engineer
Aaron Hunt, Automation Engineer
Dee Waldron



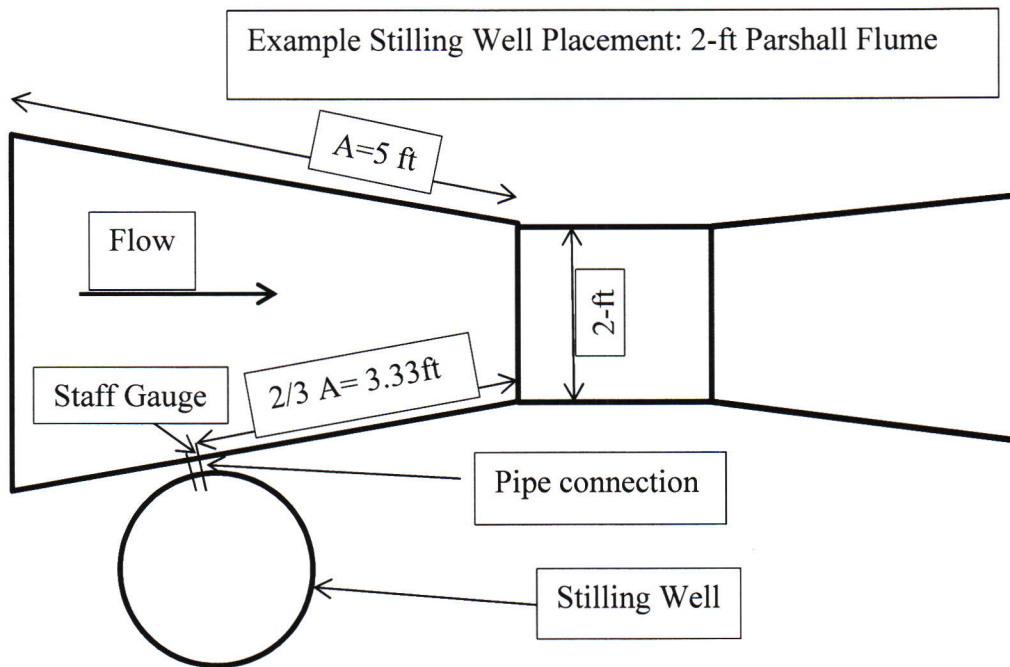
STILLING WELLS ON MEASURING DEVICES version 10.1.2015

Stilling Wells are simply wide short “wells” that “still” the surface of the water enabling an accurate water level to be recorded. A Stilling Well is a vertical water conduit extending from below the lowest anticipated water level at the base to above the highest anticipated water level at the top. Stilling Wells are usually constructed of galvanized corrugated metal pipe (CMP) “culvert”, but are sometimes made of concrete (formed and/or precast). Plastic pipe is not ideal because it expands and contracts with temperature more than steel or concrete, but it is sometimes used. Stilling Wells have a weatherproof roof or locking lid to protect the equipment.

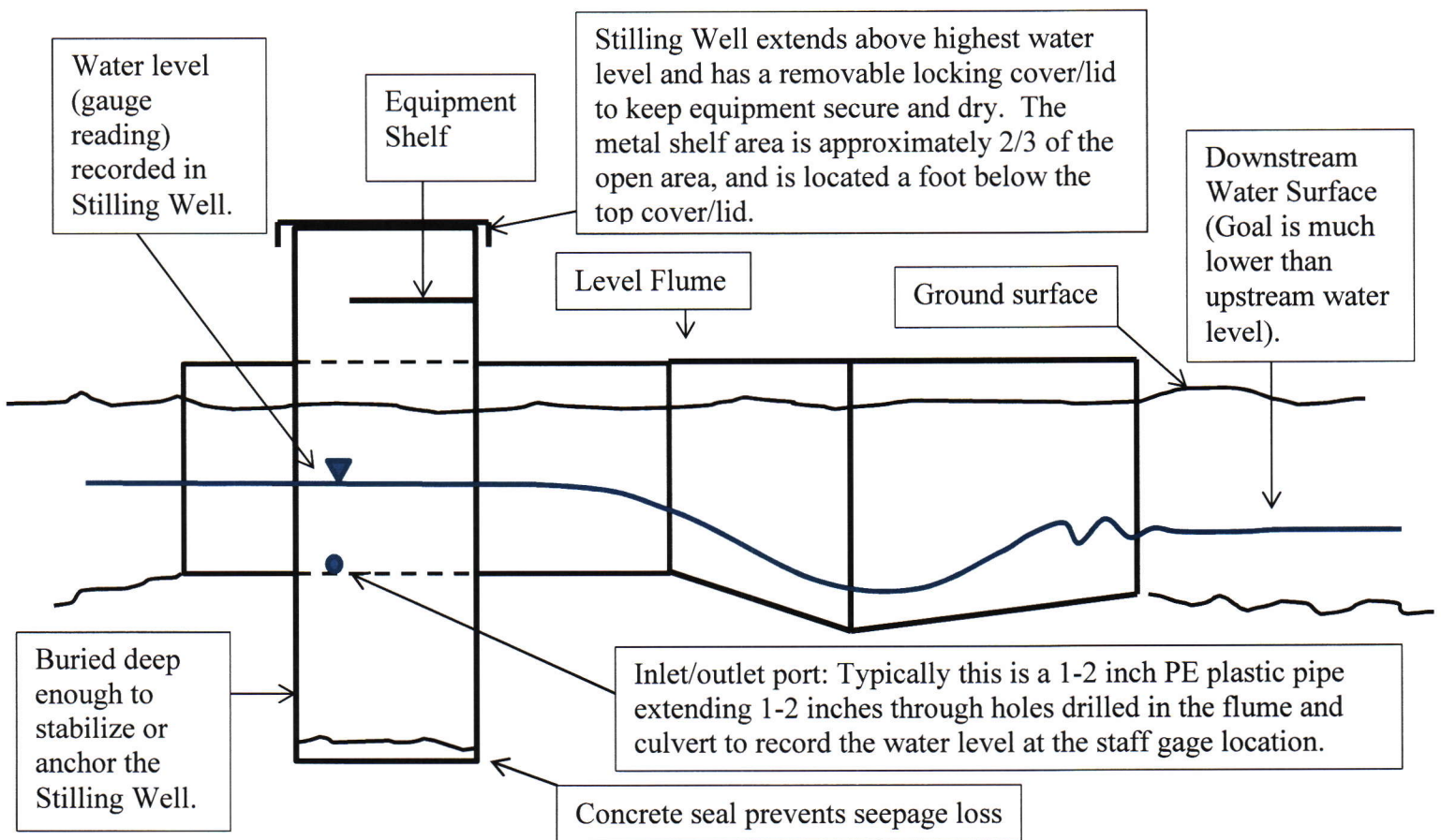
The water in the Stilling Well must “connect” with the water in the measuring device by means of a conduit, tube, or opening that allows “unobstructed” water movement to and from the Stilling Well. This interconnection enables the Stilling Well to quickly replicate/reflect the same water level in the measuring device or stream channel. A rating table or equation is then used to convert the water level to a water flow record.

Properly-installed Stilling Wells should be:

1. A minimum diameter of 18-inches to allow room for equipment. In some existing situations smaller diameters can work fine, but 24-inch diameter Stilling Wells are ideal.
2. Sufficiently deep. Typically the bottom extends 0.5-1 foot below the lowest anticipated water level to provide some room for sediment accumulation.
3. Sufficiently tall. Typically the top extends 2 feet or more above the highest anticipated water level.
4. Fitted with a shelf and locking lid or a box on top to house equipment.
5. Vertical. The mechanical sensors use a “float and counterweight” hanging from a wheel connected to an electronic recorder. If the Stilling Well leans too much, the hanging equipment bumps into the sides, causing measurement errors.
6. Anchored. The bottom can be set into the ground far enough to prevent movement. Alternatively, Stilling Wells are sometimes fasted to a concrete structure or wall.
7. Sealed, if buried. The floor of the Stilling Well, if buried underground, must not allow water to seep out, which could cause measurement errors. A thin layer of concrete is usually used to seal the floor. If the Stilling Well is inside the stream anchored to a concrete wall for stability, a bottom seal is usually not necessary.
8. Connected to the water level in the measuring device. The locations of the connection(s) are often important. The goal being to replicate a specific water level at the measuring device at a specified location. If the water level in the channel drops below the connection port, it cannot measure the lower flows so the connection should be as low as possible. Connections vary in size, shape, and material. In most situations, polyethylene sprinkler pipe (1-inch or more in diameter) works fine. If the pipe is smaller than the opening, a larger pipe may be used. Space around the pipe should be sealed to minimize leakage from the connections.
9. Corrosion and impact resistant. Steel CMP culvert is typically zinc coated to resist rust and corrosion and is available in a variety of wall thicknesses. With a quality product and routine cleanings, Stilling Wells can last for many (50+) years without any need for replacement. If a Stilling Well gets damaged to the extent that it doesn’t operate correctly, it should be replaced.



Plan View (not to scale)



Elevation View (not to scale)